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RSVP-TE Extensions for Collecting SRLG Information
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Abstract

This document provides extensions for the Resource ReserVation Protocol-Traffic Engineering (RSVP-TE) to support automatic collection of Shared Risk Link Group (SRLG) Information for the TE link formed by a LSP.

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1. Introduction

It is important to understand which TE links in the network might be at risk from the same failures. In this sense, a set of links may constitute a 'shared risk link group' (SRLG) if they share a resource whose failure may affect all links in the set [[RFC4202](#)].

On the other hand, as described in [[RFC4206](#)] and [[RFC6107](#)], H-LSP (Hierarchical LSP) or S-LSP (stitched LSP) can be used for carrying one or more other LSPs. Both of the H-LSP and S-LSP can be formed as a TE link. In such cases, it is important to know the SRLG information of the LSPs that will be used to carry further LSPs.

This document provides an automatic mechanism to collect the SRLG for the TE link formed by a LSP. Note that how to use the collected SRLG information is out of scope of this document

2. RSVP-TE Requirements

2.1. SRLG Collection Indication

The head nodes of the LSP must be capable of indicating whether the SRLG information of the LSP should be collected during the signaling procedure of setting up an LSP. SRLG information should not be collected without an explicit request for it being made by the head node.

2.2. SRLG Collection

If requested, the SRLG information should be collected during the setup of an LSP. The endpoints of the LSP may use the collected SRLG information and use it for routing, sharing and TE link configuration purposes.

2.3. SRLG Update

When the SRLG information of an existing LSP for which SRLG information was collected during signaling changes, the relevant nodes of the LSP must be capable of updating the SRLG information of the LSP. This means that the signaling procedure must be capable of updating the new SRLG information.

3. RSVP-TE Extensions (Encoding)

3.1. SRLG Collection Flag

In order to indicate nodes that SRLG collection is desired, this document defines a new flag in the Attribute Flags TLV, which is carried in an LSP_REQUIRED_ATTRIBUTES Object: [Editor's note: LSP_ATTRIBUTES Object is also under consideration]

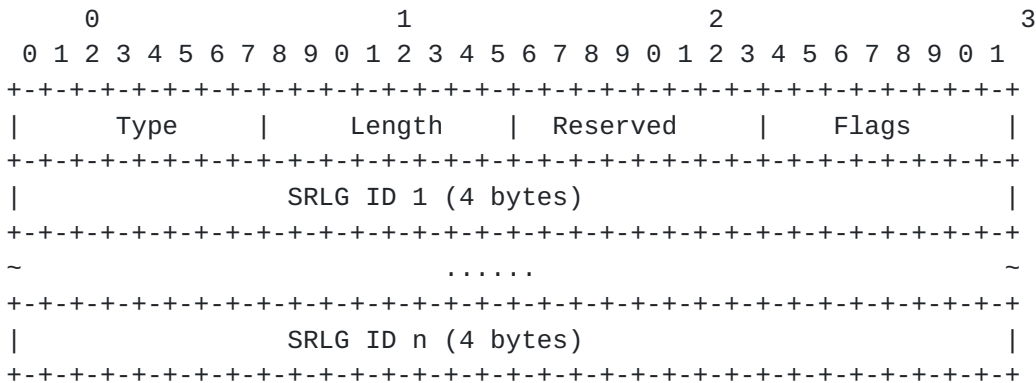
- o Bit Number (to be assigned by IANA, recommended bit zero): SRLG Collection flag

The SRLG Collection flag is meaningful on a Path message. If the SRLG Collection flag is set to 1, it means that the SRLG information should be reported to the head and tail node along the setup of the LSP.

The rules of the processing of the Attribute Flags TLV are not changed.

3.2. SRLG sub-object

This document defines a new RRO sub-object (ROUTE_RECORD sub-object) to record the SRLG information of the LSP. Its format is modeled on the RRO sub-objects defined in [RFC 3209](#) [[RFC3209](#)].



Type

The type of the sub-object, to be assigned by IANA, which is recommended 34.

Length

The Length contains the total length of the sub-object in bytes, including the Type and Length fields. The Length depends on the number of SRLG IDs.

Flags

The Flags are used to indicate properties of the SRLG-list contained in the sub-object.

0x01 = SRLG-list edited

If set, this flag indicates that the SRLG-list contained in the RRO sub-object has been edited in some way by a node during signaling in accordance with that node's policy.

0x02 = Partial SRLG-list

If set, this flag indicates that the SRLG-list contained in this RRO sub-object is known to be incomplete.

SRLG Id

The 32-bit identifier of the SRLG.

Reserved

This field is reserved. It SHOULD be set to zero on transmission and MUST be ignored on receipt.

The rules of the processing of the LSP_REQUIRED_ATTRIBUTES Object and ROUTE_RECORD Object are not changed.[Editor's note: The rules of processing LSP_ATTRIBUTES Object (which is under consideration) are also not changed]

4. Signaling Procedures

4.1. SRLG Collection

Typically, the head node gets the route information of an LSP by adding a RRO which contains the sender's IP addresses in the Path message. If a head node also desires SRLG recording, it sets the SRLG Collection Flag in the Attribute Flags TLV which can be carried in an LSP_REQUIRED_ATTRIBUTES Object.

When a node receives a Path message which carries an LSP_REQUIRED_ATTRIBUTES Object and the SRLG Collection Flag is set, if local policy determines that the SRLG information should not be provided to the endpoints, it must return a PathErr message to reject the Path message. Otherwise, it must add an SRLG sub-object to the RRO to carry the local SRLG information. Then it forwards the Path message to the next node in the downstream direction.

[Editor's note: It is under consideration that with the Path message

carries an LSP_REQUIRED_ATTRIBUTES Object and the SRLG Collection Flag is set, if local policy determines that the SRLG information should not be provided to the endpoints, the Path message should not be rejected and the SRLG sub-object must not be added]

Following the steps described above, the intermediate nodes of the LSP can collect the SRLG information in the RRO during the forwarding of the Path message hop by hop. When the Path message arrives at the tail node, the tail node can get the SRLG information from the RRO.

Before the Resv message is sent to the upstream node, the tail node adds an SRLG sub-object to the RRO. The collected SRLG information can be carried in the SRLG sub-object. Therefore, during the forwarding of the Resv message in the upstream direction, the SRLG information is not needed to be collected hop by hop.

Based on the above procedure, the endpoints can get the SRLG information automatically. Then the endpoints can for instance advertise it as a TE link to the routing instance based on the procedure described in [\[RFC6107\]](#) and configure the SRLG information of the FA automatically.

It is noted that a node (e.g. the edge node of a domain) may edit the RRO to remove the route information (e.g. node, interface identifier information) before forwarding it due to some reasons (e.g. confidentiality or reduce the size of RRO). A node MAY edit SRLG information within the RRO of a Path or Resv message if dictated by its local policy. If a node makes such an alteration to an existing RRO object, it SHOULD set the "SRLG-list edited" flag in the edited RRO sub-object to indicate to other nodes that this has been done.

[Editor's note: Two behaviors are under consideration: using LSP_REQUIRED_ATTRIBUTES the collection is mandatory, while using LSP_ATTRIBUTES the collection is desired, but not mandatory]

4.2. SRLG Update

When the SRLG information of a link is changed, the LSPs using that link should be aware of the changes. The procedures defined in [Section 4.4.3 of RFC 3209](#) [\[RFC3209\]](#) MUST be used to refresh the SRLG information if the SRLG change is to be communicated to other nodes according to the local node's policy. If local policy is that the SRLG change should be suppressed or would result in no change to the previously signaled SRLG-list, the node need not send an update

5. Manageability Considerations

5.1. Policy Configuration

In a border node of inter-domain or inter-layer network, the following SRLG processing policy should be capable of being configured:

- o Whether the SRLG IDs of the domain or specific layer network can be exposed to the nodes outside the domain or layer network, or whether they should be summarized or removed entirely.
- o If SRLGs are summarized or removed, whether the "SRLG-list edited" flag is set in affected SRLG RRO-sub-objects.
- o If the SRLG IDs must not be exposed to the nodes outside of the domain or specific layer network by policy, the border node must reject the Path message desiring SRLG recording and send a PathErr message with the defined error code 'Policy Control Failure'/'Inter-domain policy failure'. [Editor's note: This last statement may be removed in next versions and do not impose such rejection.]

5.2. Coherent SRLG IDs

In a multi-layer multi-domain scenario, SRLG ids may be configured by different management entities in each layer/domain. In such scenarios, maintaining a coherent set of SRLG IDs is a key requirement in order to be able to use the SRLG information properly. Thus, SRLG IDs must be unique. Note that current procedure is targeted towards a scenario where the different layers and domains belong to the same operator, or to several coordinated administrative groups.

Further scenarios, where coherence in the SRLG IDs cannot be guaranteed are out of the scope of the present document and are left for further study.

6. Security Considerations

TBD.

7. IANA Considerations

7.1. RSVP Attribute Bit Flags

The IANA has created a registry and manages the space of attributes bit flags of Attribute Flags TLV as described in [section 11.3 of \[RFC5420\]](#). It is requested that the IANA makes assignments from the Attribute Bit Flags.

This document introduces a new Attribute Bit Flag:

- o Bit number: TBD (10)
- o Defining RFC: this I-D
- o Name of bit: SRLG Collection Flag
- o The meaning of the Attribute Flags TLV on a Path is defined in this I-D

7.2. ROUTE_RECORD Object

IANA has made the following assignments in the "Class Names, Class Numbers, and Class Types" section of the "RSVP PARAMETERS" registry located at <http://www.iana.org/assignments/rsvp-parameters>. We request that IANA make assignments from the ROUTE_RECORD [RFC 3209 \[RFC3209\]](#) portions of this registry.

This document introduces a new RRO sub-object:

Type	Name	Reference
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TBD (34)	SRLG sub-object	This I-D

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9. Acknowledgements

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